No. 8700114

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Northrup King Co.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

SOYBEAN

'S33-45'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of* Washington, D. C. *this* 18th *day of* December *in the year of our Lord one thousand nine hundred and* eighty-seven.

Attest:

Kenneth B. Evans
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Richard E. Lyng
Secretary of Agriculture

APPROVAL EXPIRES 4-30-88

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

FORM APPROVED: OMB NO. 0581-0065

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

1. NAME OF APPLICANT(S)	2. TEMPORARY DESIGNATION	3. VARIETY NAME
Northrup King Co.	J104145	S33-45

4. ADDRESS (Street and No. or R.F.D. No., City, State, and Zip Code)	5. PHONE (Include area code)	FOR OFFICIAL USE ONLY
P. O. Box 959 Minneapolis, MN 55440	612-593-7333	PVPO NUMBER 8700114

6. GENUS AND SPECIES NAME	7. FAMILY NAME (Botanical)	FILING DATE / TIME
Glycine max	Leguminosae	April 6, 1987 10:00 ☑ A.M. ☐ P.M.

8. KIND NAME	9. DATE OF DETERMINATION	FEES RECEIVED
Soybean	March, 1986	AMOUNT FOR FILING $ 1800.00 DATE April 6, 1987 AMOUNT FOR CERTIFICATE $ 200.00 DATE November 9, 1987

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION (Corporation, partnership, association, etc.)

Corporation

11. IF INCORPORATED, GIVE STATE OF INCORPORATION	12. DATE OF INCORPORATION
Delaware	1986

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS

Robert W. Romig
Northrup King Co.
P. O. Box 959
Minneapolis, MN 55440

PHONE (Include area code): 612-593-7305

14 CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED

a. ☒ Exhibit A, Origin and Breeding History of the Variety *(See Section 52 of the Plant Variety Protection Act.)*
b. ☒ Exhibit B, Novelty Statement.
c. ☒ Exhibit C, Objective Description of Variety *(Request form from Plant Variety Protection Office.)*
d. ☒ Exhibit D, Additional Description of Variety.
e. ☒ Exhibit E, Statement of the Basis of Applicant's Ownership.

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act.)* ☐ Yes *(If "Yes," answer items 16 and 17 below)* ☒ No

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?	17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
☐ Yes ☒ No	☐ Foundation ☐ Registered ☐ Certified

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?

☐ Yes *(If "Yes," give date)*

☒ No

19. HAS THE VARIETY BEEN RELEASED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES ?

☐ Yes *(If "Yes," give names of countries and dates)*

☒ No

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT	DATE
Robert W. Romig	March 30, 1987
SIGNATURE OF APPLICANT	DATE

FORM XA-470 (2-84) (Edition of 2-84 is obsolete.)

EXHIBIT A

Origin and Breeding History of the Variety

1978-80. The Northrup King soybean research group at Washington, Iowa made the cross, 'Vickery' x 'S48' and advanced the population to F_6. In October, 1980, we harvested 100 relatively late maturing plants and threshed them individually.

1981. The Northrup King soybean research group at St. Joseph, Illinois grew each of the 100 plant selections in an F_7 progeny row. One of these, numbered J104145, was selected on the basis of agronomic appearance to be tested in a preliminary yield trial. This line was subsequently named S33-45.

1982-84. We tested S33-45 in replicated yield trials at several midwestern locations and found it to yield well in comparison to other Group III varieties. We identified and confirmed the descriptive characteristics purple flowers, grey pubescence, brown pods, yellow hila, and dull seed coat luster. We tested S33-45 for resistance to Races 1, 2, 3, 4, and 7 of Phytophthora megasperma by inoculation of detached cotyledons. It is resistant to Races 1, 2, 3, and 7 and susceptible to Race 4.

In the winter 1984-85 we initiated seed increase from approximately one Kg of carefully hand rogued seed. We removed all plants not conforming to the variety description by roguing the increase block several times.

1985-86. We continued to test S33-45 in advanced yield trials to confirm descriptive characteristics and performance.

We grew Breeder Seed of S33-45 in 1985 from the initial increase made the previous winter. The field was rogued several times. We produced Foundation Seed of S33-45 in 1986. The Iowa Crop Improvement Association inspected the production fields and found them to meet the requirements for Foundation Seed. S33-45 was approved for eligibility for certification by the National Soybean Variety Review Board on December 11, 1986.

S33-45 is a stable and uniform soybean variety. We have observed no variants in five years of testing and two years of seed increase other than minor, environmentally induced variations normally encountered in a soybean variety.

We will maintain varietal purity by use of progeny rows as needed.

EXHIBIT B

Novelty Statement for the Variety

Soybean variety S33-45 is most similar to Harper. It can be differentiated from Harper on the basis of reaction to Races 1, 2, 3, and 7 of Phytophthora megasperma. S33-45 is resistant, Harper is susceptible.

FORM APPROVED: OMB NO. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, MEAT, GRAIN & SEED DIVISION
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Soybean)

OBJECTIVE DESCRIPTION OF VARIETY
SOYBEAN (Glycine max L.*)*

NAME OF APPLICANT(S)	TEMPORARY DESIGNATION	VARIETY NAME
Northrup King Co.		

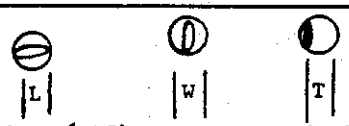
ADDRESS *(Street and No., or R.F.D. No., City, State, and Zip Code)*
P. O. Box 959
Minneapolis, MN 55440
Attention: Robert W. Romig

FOR OFFICIAL USE ONLY
PVPO NUMBER
8700114

Choose the appropriate response which characterizes the variety in the features described below. When the number of significant digits in your answer is fewer than the number of boxes provided, place a zero in the first box when number is 9 or less (e.g., [0][9]).

1. SEED SHAPE:

[1]



1 = Spherical (L/W, L/T, and T/W ratios = < 1.2)
2 = Spherical Flattened (L/W ratio > 1.2; L/T ratio = < 1.2)
3 = Elongate (L/T ratio > 1.2; T/W = < 1.2)
4 = Elongate Flattened (L/T ratio > 1.2; T/W > 1.2)

2. SEED COAT COLOR: (Mature Seed)

[1] 1 = Yellow 2 = Green 3 = Brown 4 = Black 5 = Other *(Specify)* _____

3. SEED COAT LUSTER: (Mature Hand Shelled Seed)

[1] 1 = Dull ('Corsoy 79'; 'Braxton') 2 = Shiny ('Nebsoy'; 'Gasoy 17')

4. SEED SIZE: (Mature Seed)

[1][9] Grams per 100 seeds

5. HILUM COLOR: (Mature Seed)

[2] 1 = Buff 2 = Yellow 3 = Brown 4 = Gray 5 = Imperfect Black 6 = Black 7 = Other *(Specify)* _____

6. COTYLEDON COLOR: (Mature Seed)

[1] 1 = Yellow 2 = Green

7. SEED PROTEIN PEROXIDASE ACTIVITY:

[1] 1 = Low 2 = High

8. SEED PROTEIN ELECTROPHORETIC BAND:

[2] 1 = Type A ($SP1^a$) 2 = Type B ($SP1^b$)

9. HYPOCOTYL COLOR:

[4] 1 = Green only ('Evans'; 'Davis') 2 = Green with bronze band below cotyledons ('Woodworth'; 'Tracy')
3 = Light Purple below cotyledons ('Beeson'; 'Pickett 71')
4 = Dark Purple extending to unifoliate leaves ('Hodgson'; 'Coker Hampton 266A')

10. LEAFLET SHAPE:

[3] 1 = Lanceolate 2 = Oval 3 = Ovate 4 = Other *(Specify)* _____

4

11. LEAFLET SIZE:

[2] 1 = Small ('Amsoy 71'; 'A5312') 2 = Medium ('Corsoy 79'; 'Gasoy 17')
3 = Large ('Crawford'; 'Tracy')

12. LEAF COLOR:

[2] 1 = Light Green ('Weber'; 'York') 2 = Medium Green ('Corsoy 79'; 'Braxton')
3 = Dark Green ('Gnome'; 'Tracy')

13. FLOWER COLOR:

[2] 1 = White 2 = Purple 3 = White with purple throat

14. POD COLOR:

[2] 1 = Tan 2 = Brown 3 = Black

15. PLANT PUBESCENCE COLOR:

[1] 1 = Gray 2 = Brown (Tawny)

16. PLANT TYPES:

[2] 1 = Slender ('Essex'; 'Amsoy 71') 2 = Intermediate ('Amcor'; 'Braxton')
3 = Bushy ('Gnome'; 'Govan')

17. PLANT HABIT:

[3] 1 = Determinate ('Gnome'; 'Braxton') 2 = Semi-Determinate ('Will')
3 = Indeterminate ('Nebsoy'; 'Improved Pelican')

18. MATURITY GROUP:

[ ][6] 1 = 000 2 = 00 3 = 0 4 = I 5 = II 6 = III 7 = IV 8 = V
9 = VI 10 = VII 11 = VIII 12 = IX 13 = X

19. DISEASE REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

BACTERIAL DISEASES:

[ ] Bacterial Pustule *(Xanthomonas phaseoli* var. *sojensis)*

[ ] Bacterial Blight *(Pseudomonas glycinea)*

[ ] Wildfire *(Pseudomonas tabaci)*

FUNGAL DISEASES:

[1] Brown Spot *(Septoria glycines)*

Frogeye Leaf Spot *(Cercospora sojina)*

[ ] Race 1 [ ] Race 2 [ ] Race 3 [ ] Race 4 [ ] Race 5 [ ] Other *(Specify)*

[ ] Target Spot *(Corynespora cassiicola)*

[ ] Downy Mildew *(Peronospora trifoliorum* var. *manshurica)*

[2] Powdery Mildew *(Microsphaera diffusa)*

[1] Brown Stem Rot *(Cephalosporium gregatum)*

[ ] Stem Canker *(Diaporthe phaseolorum* var. *caulivora)*

19. DISEASE REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant) (Continued)

FUNGAL DISEASES: (Continued)

[1] Pod and Stem Blight *(Diaporthe phaseolorum* var; *sojae)*

[1] Purple Seed Stain *(Cercospora kikuchii)*

[ ] Rhizoctonia Root Rot *(Rhizoctonia solani)*

Phytophthora Rot *(Phytophthora megasperma* var. *sojae)*

[2] Race 1 [2] Race 2 [2] Race 3 [1] Race 4 [1] Race 5 [2] Race 6 [2] Race 7

[2] Race 8 [2] Race 9 [ ] Other *(Specify)* _____

VIRAL DISEASES:

[ ] Bud Blight (Tobacco Ringspot Virus)

[ ] Yellow Mosaic (Bean Yellow Mosaic Virus)

[ ] Cowpea Mosaic (Cowpea Chlorotic Virus)

[ ] Pod Mottle (Bean Pod Mottle Virus)

[ ] Seed Mottle (Soybean Mosaic Virus)

NEMATODE DISEASES:

Soybean Cyst Nematode *(Heterodera glycines)*

[1] Race 1 [1] Race 2 [1] Race 3 [1] Race 4 [ ] Other *(Specify)* _____

[ ] Lance Nematode *(Hoplolaimus Colombus)*

[ ] Southern Root Knot Nematode *(Meloidogyne incognita)*

[ ] Northern Root Knot Nematode *(Meloidogyne Hapla)*

[ ] Peanut Root Knot Nematode *(Meloidogyne arenaria)*

[ ] Reniform Nematode *(Rotylenchulus reniformis)*

[ ] OTHER DISEASE NOT ON FORM *(Specify):* _____

20. PHYSIOLOGICAL RESPONSES: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

[1] Iron Chlorosis on Calcareous Soil

[ ] Other *(Specify)* _____

21. INSECT REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

[ ] Mexican Bean Beetle *(Epilachna varivestis)*

[ ] Potato Leaf Hopper *(Empoasca fabae)*

[ ] Other *(Specify)* _____

22. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED.

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant Shape	S30-31	Seed Coat Luster	Corsoy
Leaf Shape	Sherman	Seed Size	Harper
Leaf Color	Harper	Seed Shape	S39-99
Leaf Size	Pella	Seedling Pigmentation	Hodgson

23. GIVE DATA FOR SUBMITTED AND SIMILAR STANDARD VARIETY: Paired Comparison Data

VARIETY	NO. OF DAYS MATURITY	PLANT LODGING SCORE	CM PLANT HEIGHT	LEAFLET SIZE		SEED CONTENT		SEED SIZE G/100 SEEDS	NO. SEEDS/ POD
				CM Width	CM Length	% Protein	% Oil		
Submitted	128	2.6	103	5.5	11.5	41.3	23.1	18.9	2-3
Pella Name of Similar Variety	125	2.2	103	5.9	11.0	39.4	23.0	20.0	2-3

PUBLICATIONS USEFUL AS REFERENCE AIDS FOR COMPLETING THIS FORM:

1. Caldwell, B.E., ed. 1973. Soybeans: Improvement, Production, and Uses. Amer. Soc. Agron. Monograph No. 16.
2. Buttery, B.R. and R.I. Buzzell. 1968. Peroxidase activity in seeds of soybean varieties. Crop Sci., 8: 722-725.
3. Hymowitz, T. 1973. Electrophoretic analysis of SBTI-A_2 in the USDA soybean germplasm collection. Crop Sci., 13: 420-421.
4. Payne, R.C. and L.F. Morris. 1976. Differentiation of soybean cultivars by seedling pigmentation patterns. J. Seed Technol. 1: 1-19.

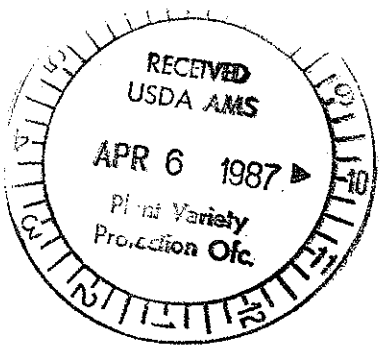


EXHIBIT D

Additional Description of the Variety

Soybean variety S33-45 is a mid Group III cultivar maturing between Pella and Williams 82. It exhibits long hypocotyl reaction when grown in 4.5 inches of sand at 77° F for 14 days. It has the Rps 1-C gene for resistance to Races 1-3, and 6-10 of Phytophthora megasperma.

EXHIBIT E

Statement of the Basis of Applicant's Ownership

Soybean variety S33-45 was developed by the Northrup King Co. soybean breeding staff from germplasm sources cited in Exhibit A of this application. Northrup King Co. believes that the variety is novel as defined in the Plant Variety Protection Act and, therefore, that Northrup King is the sole owner of the variety.